

FORM PTO-1390 REV. 5-93		US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEYS DOCKET NUMBER <b>P00,0408</b>
<b>TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371</b>			U.S. APPLICATION NO. (if known, see 37 CFR 1.5) <b>09/486866</b>
INTERNATIONAL APPLICATION NO. <b>PCT/DE98/02474</b>	INTERNATIONAL FILING DATE 24 August 1998	PRIORITY DATE CLAIMED 2 September 1997	
TITLE OF INVENTION <b>"ROAMING OF MOBILE PARTS IN AT LEAST PARTIALLY ASYNCHRONOUS TELECOMMUNICATION NETWORKS, PARTICULARLY DECT NETWORKS"</b>			
APPLICANT(S) FOR DO/EO/US <b>Egon SCHULZ and Rolf BIEDERMANN</b>			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<ol style="list-style-type: none"> <li>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.</li> <li>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</li> <li>5. <input checked="" type="checkbox"/> A copy of International Application as filed (35 U.S.C. 371(c)(2))           <ol style="list-style-type: none"> <li>a. <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input type="checkbox"/> has been transmitted by the International Bureau.</li> <li>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US)</li> </ol> </li> <li>6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</li> <li>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 5371(c)(3))           <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input type="checkbox"/> have been transmitted by the International Bureau.</li> <li>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</li> <li>d. <input checked="" type="checkbox"/> have not been made and will not be made.</li> </ol> </li> <li>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</li> <li>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</li> <li>10. <input checked="" type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</li> <li>11. <input checked="" type="checkbox"/> <b>below concern other document(s) or information included:</b> <ol style="list-style-type: none"> <li>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; (PTO 1449, Prior Art, Search Report).</li> </ol> </li> <li>12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included. (SEE ATTACHED ENVELOPE)</li> <li>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment.           <ol style="list-style-type: none"> <li><input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</li> </ol> </li> <li>14. <input type="checkbox"/> A substitute specification.</li> <li>15. <input type="checkbox"/> A change of power of attorney and/or address letter.</li> <li>16. <input checked="" type="checkbox"/> Other items or information:           <ol style="list-style-type: none"> <li>a. <input checked="" type="checkbox"/> Submittal of Drawings -</li> <li>b. <input checked="" type="checkbox"/> <b>EXPRESS MAIL #EL497037109 US, dated March 2, 2000.</b></li> </ol> </li> </ol>			

17. ☒ The following fees are submitted:**BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5):**

Search Report has been prepared by the EPO or JPO ..... \$840.00

International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) .. \$700.00

No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but  
international search fee paid to USPTO (37 C.F.R. 1.445(a)(2)) ..... \$770.00Neither international preliminary examination fee (37 C.F.R. 1.482) nor international  
search fee (37 C.F.R. 1.445(a)(2)) paid to USPTO ..... \$1040.00International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all  
claims satisfied provisions of PCT Article 33(2)-(4) ..... \$ 96.00**ENTER APPROPRIATE BASIC FEE AMOUNT =**

CALCULATIONS

PTO USE ONLY

\$ 840.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months  
from the earliest claimed priority date (37 C.F.R. 1.492(e)).

\$

Claims

Number Filed

Number

Rate

Extra

Total Claims

19 - 20 =

X \$ 18.00

\$

Independent Claims

1 - 3 =

X \$ 78.00

\$

Multiple Dependent Claims

\$260.00 +

\$

**TOTAL OF ABOVE CALCULATIONS =**

\$ 840.00

Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must  
also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)

\$

**SUBTOTAL =**

\$ 840.00

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months  
from the earliest claimed priority date (37 CFR 1.492(f)).

\$

+

**TOTAL NATIONAL FEE =**

\$ 840.00

Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be  
accompanied by an appropriate cover sheet (37 C.F.R. 3.26, 3.31). \$40.00 per property

+

**TOTAL FEES ENCLOSED =**

\$ 840.00

Amount to be  
refunded

\$

charged

\$

a. ☒ A check in the amount of \$ 840.00 to cover the above fees is enclosed.b. ☐ Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \$ \_\_\_\_\_ to cover the above fees.  
A duplicate copy of this sheet is enclosed.c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any  
overpayment to Deposit Account No. 08-2290. A duplicate copy of this sheet is enclosed.NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be  
filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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SIGNATURE

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31,870

Registration Number

**"PRELIMINARY AMENDMENT"**

5        APPLICANT:            Egon SCHULZ et al.

SERIAL NO.: EXAMINER:

FILING DATE: ART UNIT:

INTERNATIONAL APPLICATION NO.: PCT/DE98/02474

INTERNATIONAL FILING DATE: 24 August 1998

10 INVENTION: ROAMING OF MOBILE PARTS IN AT LEAST  
PARTIALLY ASYNCHRONOUS  
TELECOMMUNICATION NETWORKS,  
PARTICULARLY DECT NETWORKS

Hon. Assistant Commissioner for Patents  
Box PCT  
Washington D.C. 20231

SIR:

Amend the above-identified international application before entry into the national stage before the U.S. Patent & Trademark Office under 35 U.S.C. §371 as follows:

## IN THE SPECIFICATION

On page 1, before the title, insert --

## SPECIFICATION

**TITLE--;**

after the title, insert --

## **BACKGROUND OF THE INVENTION**

### **Field of the Invention**

The present invention relates generally to a telecommunication systems  
5 for wireless, at least partially asynchronous telecommunication networks,  
particularly DECT systems for at least partially asynchronous DECT networks--;  
and

after line 3, insert --

### **Description of the Related Art--.**

10 On page 2, in line 1, before "(1)...(3)" insert --the foregoing forms--;  
in line 3, after "according to" insert --the above form--; and  
in lines 7 and 8, delete "according to the preamble of patent claim 1 and  
according to the preamble of patent claim 20." .

15 On page 3, in line 10, before "WO 95/05040" insert --published PCT  
patent application--.

On page 4, in line 17, before "timer" insert --a--;  
in line 20, before "immediately" insert --which are--;  
in line 22, before "time" insert --a--; and  
in line 23, before "burst" insert --a--.

20 On page 5, in line 9, before "keyboard" insert --a-- and before "display"  
insert --a--;  
in line 10, before "handset" insert --a--; before "microphone" insert --a--  
and after "and" insert --an--;

in line 12, before "option" insert --an--;

in line 27, before "WO 94/10764" insert --published PCT patent application--;

in line 28, change "such (gap-free)" to --(to provide gap-free--; and

5

in line 29, before "that" insert --such--.

On page 6, in line 23, before "WO95/05040" insert --published PCT patent application--.

On page 7, in line 3, before "WO95/05040" insert --the international application--; and

10

in line 4, before "DECT" insert --a--.

On page 8, in line 10, before "GSM" insert --a-- and before "PSTN" insert --a--.

On page 9, in line 18, before "RPP" insert --part--; and

in line 24, before "local" insert --a--.

15

On page 10, in line 4, before "user" insert --a--; and

in line 5, before "typical" insert --a--.

On page 11, in line 15, change "said" to --the--.

On substitute page 15, in line 10, before "decision" insert --a--; and  
in line 31, before "asynchronous" insert --that is--.

On substitute page 16, in line 5, before "WO 97/15160" insert --Published PCT patent application--;

in line 16, before "5,448,569" insert --Patent No.--;

after line 21, insert --

5

#### **SUMMARY OF THE INVENTION--;**

in lines 25 and 26, delete "defined in the preamble of patent claim 1" and insert --for wireless, at least partially asynchronous telecommunication networks, particularly DECT systems for at least partially asynchronous DECT networks--;

10

in lines 26 and 27, delete "the features recited in the characterizing part of patent claim 1." and insert --first base stations that are synchronous with first mobile parts and in whose proximity at least respectively one second base station that is/are respectively asynchronous relative to the first base stations is arranged, whereby the base stations and first mobile stations are connectible by the wireless transmission of messages, in that first messages having first information are at least temporarily sent at least from one part of the first base stations, whereby the information indicate that the first base stations are respectively surrounded by at least one of the second base stations.--;

15

20

in lines 28 - 30, delete "Proceeding from the telecommunication systems defined in the preamble of patent claim 20, this object is also achieved by the features recited in the characterizing part of patent claim 20."

On substitute page 17, delete "(claim 1)" and insert --as first set forth--;

in line 2, change "in at least" to --in an at least--;

in line 9, delete "[sic]";

25

in line 13, delete "According to claim 9" and insert --In an embodiment wherein the first mobile parts - after receiving the first messages - become asynchronous relative to the first base stations for a predetermined time span

dependent on mobile part location-specific reception criteria in order to search for second base stations--;

in line 19, before "asynchronous" insert --an--;

5 in line 24, delete "according to claims 10 through 20" and insert --in an embodiment having the first mobile parts are respectively asynchronous relative to the first base stations in view of the bit, time slot and/or time frame synchronism--;

in line 25, before "WO96/33991" insert --the published PCT patent application--; and

10 in line 26, delete "in conjunction with patent claims 1 and 3".

On page 18, in line 8, before "WO96/38990" insert --published PCT patent application--;

15 in lines 15 and 16, delete "are recited in the other subclaims." and insert --are provided by a telecommunication systems wherein the synchronism between the first base stations and the first mobile parts exists in the idle locked mode of the first mobile parts. The synchronism between the first base stations and the first mobile parts may exist in the active locked mode of the first mobile parts. In one embodiment, the telecommunication systems are TDMA-based telecommunication systems. The first base stations are respectively asynchronous relative to the second base station or stations in view of the bit, time slot and/or time frame synchronism. One feature provides that the part of the first base stations regularly sends the first messages with the first information. The part of the first base stations may automatically send the first messages with the first information. According to the invention, the part of the first base stations is initiated by the network side to send the first messages with the first information. 25 In particular, the first mobile parts interrupt the search for a predetermined time

span after they have searched for the second base stations. Specifically, the first mobile parts comprise time counters for acquiring the time span. Preferably, the first base stations load the time counters of the first mobile parts with the predetermined time span as start value on the basis of the wireless transmission of the messages. The first base stations comprise memories wherein the time spans are stored. The time span can be delivered to the first base stations from the network side. In the telecommunication systems, the time span is a multiple of the time slot or time frame. The first mobile parts repeat the search procedures at regular time intervals given unsuccessful attempts to seek the second base stations. The mobile location-specific reception criteria are the downward transgression of mobile part location-specific reception field strength thresholds. The mobile part location-specific reception field strength thresholds and threshold for initiation of inter-cell handover are of the same size.--;

after line 16, insert --

**BRIEF DESCRIPTION OF THE DRAWINGS--;**

after line 18, insert --

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS--;**

in line 20, after "fashioned as" insert --a--.

On page 19, in line 8, change "if" to --is--.

On page 20, in line 5, before "WO 96/38991" insert --published PCT patent application--;

in lines 5 and 6, delete "in conjunction with patent claims 1 through 3"; and

in line 26, before "WO 96/38990" insert --international application--.



On page 21, after line 3, add the following new paragraph --

Although other modifications and changes may be suggested by those skilled in the art, it is the intention of the inventors to embody within the patent warranted hereon all changes and modifications as reasonably and properly come within the scope of their contribution to the art.--.

### IN THE CLAIMS

On substitute page , line 1, change "Patent Claims" to --I Claim:--.

Amend claim 1 as follows:

1. (Amended) A telecommunication [Telecommunication] systems for wireless, at least partially asynchronous telecommunication networks, [particularly DECT systems for at least partially asynchronous DECT networks,] comprising:

first mobile parts;

first base stations [(BS1, RFP1, DIFS1)] that are synchronous with said first

mobile parts; [(MT1, RPP1, DIPS1) and in whose proximity]

at least [respectively] one second base station [(BS2, RFP2, DIFS2)] that is [/are]

[respectively] asynchronous relative to the first base stations, said at least

one second base station being in a proximity of said first base stations;

[(BS1, RFP1, DIFS1) is arranged, whereby the]

said first and second base stations [(BS1, RFP1, DIFS1, BS2, RFP2, DIFS2)] and

said first mobile stations being [(MT1, RPP1, DIPS1) are] connectible by

[the] wireless transmission of messages; and [, characterized in that]

first messages [(N1)] having first information are at least temporarily sent at least

from one part of the first base stations [(BS1, RFP1, DIFS1)], [whereby

the] said first information indicating [indicate] that the first base stations

[(BS1, RFP1, DIFS1)] are [respectively] surrounded by at least one of the

second base stations [/sic] (BS2, RFP2, DIFS2)].

2.(Amended) A telecommunication [Telecommunication] systems according to claim 1, wherein [characterized in that the] synchronism between the first base stations [(BS1, RFP1, DIFS1)] and the first mobile parts [(MT1, RPP1, DIPS1)] exists in an [the] idle locked mode of the first mobile parts [(MT1, RPP1, DIPS1)].

3.(Amended) A telecommunication [Telecommunication] systems according to claim 1 [or 2], wherein [characterized in that the] synchronism between the first base stations [(BS1, RFP1, DIFS1)] and the first mobile parts [(MT1, RPP1, DIPS1)] exists in an [the] active locked mode of the first mobile parts [(MT1, RPP1, DIPS1)].

4.(Amended) A telecommunication [Telecommunication] systems according to claim [one of the claims] 1 [through 3], wherein [characterized in that] the telecommunication systems [(TKS1...TKS7)] are TDMA-based telecommunication systems.

5.(Amended) A telecommunication [Telecommunication] systems according to claim 4, wherein [characterized in that] the first base stations [(BS1, RFP1, DIFS1)] are respectively asynchronous relative to the second base station or stations [(BS2, RFP2, DIFS2)] in view of at least one of [the] bit, time slot and [or] time frame synchronism.

6.(Amended) A telecommunication [Telecommunication] systems according to claim [one of the claims] 1 [through 5], characterized in that the part

of the first base stations [(BS1, RFP1, DIFS1)] regularly sends the first messages [(N1)] with the first information.

7.(Amended) A telecommunication [Telecommunication] systems according to claim [one of the claims] 1 [through 6], wherein [characterized in that the] part of the first base stations [(BS1, RFP1, DIFS1)] automatically sends the first messages [(N1)] with the first information.

8.(Amended) A telecommunication [Telecommunication] systems according to claim [one of the claims] 1 [through 6], wherein [characterized in that the] part of the first base stations [(BS1, RFP1, DIFS1)] is initiated by the network side to send the first messages [(N1)] with the first information.

9.(Amended) A telecommunication [Telecommunication] systems according to claim [one of the claims] 1 [through 8], wherein [characterized in that] the first mobile parts [(MT1, RPP1, DIPS1)] - after receiving the first messages - become asynchronous relative to the first base stations [(BS1, RFP1, DIFS1)] for a predetermined time span dependent on mobile part location-specific reception criteria in order to search for said second base stations [(BS2, RFP2, DIFS2)].

10.(Amended) A telecommunication [Telecommunication] systems according to claim 4 [and 9], wherein [characterized in that] the first mobile parts [(MT1, RPP1, DIPS1)] are respectively asynchronous relative to the first base stations [(BS1, RFP1, DIFS1)] in view of at least one of [the] bit, time slot and [/or] time frame synchronism.

11.(Amended) A telecommunication [Telecommunication] systems according to claim 9, wherein [characterized in that] the first mobile parts [(MT1, RPP1, DIPS1)] interrupt a [the] search for a predetermined time span after they have searched for the second base stations [(BS2, RFP2, DIFS2)].

5 12.(Amended) A telecommunication [Telecommunication] systems according to claim 11, wherein [characterized in that] the first mobile parts include [(MT1, RPP1, DIPS1) comprise] time counters [(ZZ)] for acquiring the predetermined time span.

10 13.(Amended) A telecommunication [Telecommunication] systems according to claim 12, wherein [characterized in that] the first base stations [(BS1, RFP1, DIFS1)] load the time counters [(ZZ)] of the first mobile parts [(MT1, RPP1, DIPS1)] with the predetermined time span as a start value on a [the] basis of the wireless transmission of the messages.

15 14.(Amended) A telecommunication [Telecommunication] systems according to claim 13, wherein [characterized in that] the first base stations include [(BS1, RFP1, DIFS1) comprise] memories [(SP)] wherein the predetermined time span is [are *sic*] respectively] stored.

20 15.(Amended) A telecommunication [Communication] systems according to claim 13 [or 14], wherein [characterized in that] the predetermined time span is [can be] delivered to the first base stations [(BS1, RFP1, DIFS1)] from the network side.

16.(Amended) A telecommunication [Telecommunication] systems

according to claim [one of the claims] 9 [through 15 and according to claim 4],  
wherein [characterized in that] the time span is a multiple of one of the time slot  
and [or] time frame.

5 17.(Amended) A telecommunication [Telecommunication] systems  
according to claim [one of the claims] 9 [through 16], wherein [characterized in  
that] the first mobile parts [(MT1, RPP1, DIPS1)] repeat the search procedures at  
regular time intervals given unsuccessful attempts to seek the second base stations  
[(BS2, RFP2, DIFS2)].

10 18.(Amended) A telecommunication [Telecommunication] systems  
according to claim [one of the claims] 9 [through 17], wherein [characterized in  
that] the mobile location-specific reception criteria are a [the] downward  
transgression of mobile part location-specific reception field strength thresholds.

15 19.(Amended) A telecommunication [Telecommunication] systems  
according to claim 18, wherein [characterized in that] the mobile part location-  
specific reception field strength thresholds and threshold for initiation of inter-cell  
handover are of a [the] same size.


#### IN THE ABSTRACT

20 In line 1, change "Abstract" to --Abstract of the Disclosure--;  
delete lines 2 and 3; and  
in line 14, delete "Figure 7".

**REMARKS**

The foregoing amendments to the specification and claims under Article 41 of the Patent Cooperation Treaty place the application into a form for prosecution before the U.S. Patent and Trademark Office under 35 U.S.C. §371. Accordingly, entry of these amendments before examination on the merits is hereby requested.

Respectfully submitted,



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ATTORNEY FOR APPLICANT

8/PRTS

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**ROAMING OF MOBILE PARTS IN AT LEAST PARTIALLY  
ASYNCHRONOUS TELECOMMUNICATION NETWORKS,  
PARTICULARLY DECT NETWORKS**

In message systems having a message transmission link between a  
5 message source and a message sink, transmission and reception devices are employed  
for message processing and transmission, whereby

- 1) the message processing and message transmission can ensue in a  
privileged transmission direction (simplex mode) or in both transmission  
directions (duplex mode);
- 10 2) the message processing is analog or digital;
- 3) the message transmission ensues wirelessly via the remote transmission  
link on the basis of various message transmission methods FDMA  
(frequency division multiple access), TDMA (time division multiplex  
access) and/or CDMA (code division multiple access) - for example  
15 according to radio standards such as DECT, GSM, WACS or PACS, IS-  
54, IS-95, PHS, PDC, etc. [see IEEE Communications Magazine, January  
1995, pages 50-57, D. D. Falconer et al, "Time Division Multiple Access  
Methods For Wireless Personal Communications"] - and/or ensues wire-  
bound.

20 "Message" is a higher-ranking term that stands both for the meaningful  
content (information) as well as for the physical representation (signal). Despite the  
same meaningful content of a message - i.e., the same information - different signal  
forms can occur. Thus, for example, a message directed to a subject can be  
transmitted

- 25 (1) in the form of an image,
- (2) as a spoken word,
- (3) as a written word,
- (4) as an encrypted word or image.

The transmission mode according to (1)...(3) is thereby normally characterized by continuous (analog) signals, whereas discontinuous signals (for example, pulses, digital signals) usually arise in the transmission according to (4).

Proceeding from this general definition of a message system, the invention relates to telecommunication systems for wireless, at least partially asynchronous telecommunication networks, particularly DECT systems for at least partially asynchronous DECT networks, according to the preamble of patent claim 1 and according to the preamble of patent claim 20.

Telecommunication systems of the species defined above are, for example DECT systems [digital enhanced (earlier: European) cordless telecommunication; see (1): Nachrichtentechnik Elektronik 42 (1992) January/February, No. 1, Berlin, DE; U. Pilger "Struktur des DECT-Standards", pages 23 through 29 in conjunction with ETSI publication ETS 300175-1...9, October 1992; (2): Telcom Report 16 (1993), No. 1, J. H. Koch: "Digitaler Komfort für schnurlose Telekommunikation - DECT-Standard eröffnet neue Nutzungsgebiete", pages 26 and 27; (3): tec 2/93 - the technical magazine of Ascom, "Wege zur universellen mobilen Telekommunikation", Pages 35 through 42; (4): Philips Telecommunication Review, Vol. 49, No. 3, September 1991, R. J. Mulder: "DECT, a universal cordless access system"; (5): WO 93/21719 (FIGS. 1 through 3 with appertaining description)] or GAP systems (Generic Access Profile; ETSI publication ETS 300444, December 1995, ETSI, FR) that, for example, can be constructed according to the illustration in Figure 1. The GAP standard is a sub-set of the DECT standard which is assigned the task of assuring the inter-operability of the DECT air interface for telephone applications.

According to the DECT/GAP standard and the illustration in Figure 1, a maximum of twelve connections can be set up in parallel to DECT/GAP mobile parts MT1...MT12 at a DECT/GAP base station BS over a DECT/GAP air interface designed for the frequency range between 1.88 and 1.90 GHz, being set up according to the TDMA/FDMA/TDD method (Time Division Multiple Access/Frequency



Division Multiple Access/Time Division Duplex). The number 12 derives from a plurality "k" of time slots or, respectively, telecommunication channels ( $k = 12$ ) available for the duplex mode of a DECT/GAP system. The connections can thereby be internal and/or external. Given an internal connection, two mobile parts, for

- 5 example, the mobile part MT2 and the mobile part MT3, that are registered at the base station BS can communicate with one another. For a setup of an external connection, the base station BS is connected to a telecommunication network TKN, for example in line-bound form via a telecommunication terminal unit TAE or, respectively, a private branch exchange NStA with a line-bound telecommunication network or, according to
- 10 WO 95/05040, in wireless form as repeater station with a higher-ranking telecommunication network. Given the external connection, communication can be carried out with a mobile part, for example with the mobile part MT1, via the base station BS, the telecommunication terminal unit TAE or, respectively, private branch exchange NStA, communication being carried out with a subscriber in the
- 15 telecommunication network TKN. When the base station BS - as in the case of the Gigaset 951 (Siemens cordless telephone, see Telecom Report 16, (1993) No. 1, pages 26 and 27) - has only one connection to the telecommunication terminal unit TAE or, respectively, the private branch exchange NStA, then only one external connection can be setup. When the base station BS - as in the case of the Gigaset 952 (Siemens
- 20 Cordless Telephone; see Telecom Report 16 (1993), No. 1 pages 26 and 27) - has two connections to the telecommunication network TKN, then a further external connection from a line-bound telecommunication terminal equipment TKE connected to the base station BS is possible in addition to the external connection to the mobile part MT1. It is thereby also fundamentally conceivable that a second mobile part, for
- 25 example, the mobile part MT12, uses the second connection for an external connection instead of the telecommunication terminal equipment TKE. Whereas the mobile parts MT1...MT12 are operated with a battery or an accumulator, the base station BS fashioned as cordless, small-scale exchange is connected to a voltage network SPN via a network connection means NAG.

Proceeding from the publication components 31 (1993), No. 6, pages 215 through 218, S. Althammer, D. Brückmann, "Hochoptimierte IC's für DECT-Schnurlostelefone", Figure 2 shows the fundamental circuit structure of the base

station BS and of the mobile part MT. The base station BS and the mobile part M2

5 accordingly comprise a radio part FKT with an antenna allocated for the transmission and reception of radio signals, a signal processing means SVE and a central controller ZST that are connected to one another in the illustrated way. It is essentially the known devices such as transmitter SE, receiver EM and synthesizer SYN that are contained in the radio part FKT. Among other things, the signal processing means

10 SVE contains an encoding/decoding means CODEC. The central controller ZST comprises a microprocessor  $\mu P$  both for the base station BS as well as for the mobile part MT, said microprocessor  $\mu P$  having a program module PGM constructed according to the OSI/ISO layer model (see (1): Unterrichtsblätter - Deutsche Telekom, Vol. 48, 2/1995, pages 102 through 111; (2): ETSI Publication ETS 300175-1...9,

15 October 1992], a memory SP for storing information intended for the base station BS or, respectively, the mobile part MT and a time counter ZZ, ZZ1, ZZ2 fashioned as timer for determining base station-specific or, respectively, mobile part-specific time information, a signal control part SST and a digital signal processor DSP that are connected to one another in the illustrated way. Of the layers defined by the layer

20 model, only the first four layers immediately critical for the base station BS and the mobile part MT are shown. The signal control part SST is implemented in the base station BS as time switch controller TSC and is implemented in the mobile part MT as burst controller BMC. The critical difference between the two signal control parts TSC, BMC is comprised therein that the base station-specific signal control part TSC

25 assumes additional switching functions compared to the mobile part-specific signal control part BMC. The signal control parts TSC, BMA respectively contain a counting means ZE with a bit counter, time slot counter and time frame counter.

The basic functioning of the circuit units recited above is described, for example, in the above-cited publication components 31 (1993), No. 6, pages 215

30 through 218.

At the base station BS and the mobile part MT, the described circuit structure according to Figure 2 is supplemented by additional function units in conformity with their function in the DECT/GAP system of Figure 1.

The base station BS is connected via the signal processing means SVE and the telecommunication terminal unit TAE or, respectively, the private branch exchange NStA, being connected to the telecommunication network TKN. As an option, the base station BS can also comprise a user interface (function units entered with broken lines in Figure 2) that, for example, is composed of an input means EE fashioned as keyboard, of a display means AE fashioned as display, a speaking/listening means SHE fashioned as handset with microphone MIF and earphone HK as well as a call tone bell TRK.

The mobile part MT comprises the user interface possible as option at the base station BS with the above-described operating elements belonging to this user interface.

Figure 3, proceeding from the DECT system according to Figure 1, shows a cellular DECT/GAP multi-system CMI (cordless multicell integration) wherein a plurality of the above-described DECT/GAP systems TKS each respectively having a base station BS and one or more mobile parts MT are present at an arbitrary geographical location, for example concentrated in an administration building with large-scale offices - in the sense of a "hot spot" arrangement. Instead of a "closed" geographical location like the administration building, however, an "open" geographical location with strategic telecommunication significance is also possible for the installation of a cellular DECT/GAP multi-system CMI, for example plazas in large cities having a high traffic volume, a high accumulation of commercial units and great movement of people. Some of the base stations BS arranged in the large-scale office, differing from the base stations shown in Figures 1 and 2, are thereby fashioned according to WO 94/10764 as antenna diversity base stations. The concentration of the DECT/GAP system TKS is thereby configured such (gap-free radio coverage of the geographical location) that individual DECT/GAP systems TKS

work in the same environment due to the overlapping, cellular DECT/GAP radio areas FB.

Dependent on the degree of overlap, the same environment can thereby mean that

- 5 a) a first base station BS1 of a first telecommunication system TKS1 is arranged in a first radio area FB1 and a second base station BS2 of a second telecommunication system TKS2 is arranged in a second radio area FB2 and can set up telecommunication connections to at least one mobile part MT<sub>1,2</sub>;
- 10 b) a third base station BS3 of a third telecommunication system TKS3 and a fourth base station BS4 of a fourth telecommunication system TKS4 are arranged in a shared, third radio area FB3 and can set up telecommunication connections to at least one mobile part MT<sub>3,4</sub>.

The cordless telecommunication scenario shown in Figures 1 through 3, wherein DECT mobile parts can be connected via a DECT air interface to a private (residential) DECT base station (Figure 1) or, respectively, to one or more private or public DECT base station (Figure 3), can then be expanded according to the publication "presentation of A. Elberse, M. Barry, G. Fleming on the subject, "DECT Data Services - DECT in Fixed and Mobile Networks", 17/18 June 1996, Hotel Sofitel, Paris; Pages 1 through 12 and summary, to the effect that the DECT mobile parts are connectible via the DECT air interface to private and public DECT base stations.

According to WO95/05040 (see Figures 3 through 8 therein with the respectively appertaining description), this scenario can then in turn be expanded in view of a universal mobile telecommunication system (UMTS) to the effect that pico-cell-related cordless telecommunication systems (for example, the previously discussed DECT systems from CTM points of view (cordless terminal mobility; see ETSI Publications (1): "IN Architecture and Functionality for the support of CTM", Draft Version 1.10, September 1995; (2): "Cordless Terminal Mobility (CTM) - Phase 1, Service Description", draft DE/NA-010039, Version 6, 2 October 1995) be linked

into a higher-ranking network infrastructure (for example, ISDN, PTSN, GSM and/or satellite networks) for accesses (see ETSI Publication, CTM Access Profile (CAP)", prETS 300824, November 1996). According to patent claim 1 of WO95/05040, this can be achieved by a DECT base station fashioned as DECT repeater. In a universal mobile telecommunication system, DECT is mainly understood as a "network access technology" for mobile communication services (see the presentation of A. Elberse, M. Barry, G. Fleming on the subject, "DECT Data Services - DECT in Fixed and Mobile Networks", 17/18 June 1996, Hotel Sofitel, Paris; Pages 1 through 12 and summary) and not as a network.

Standing for the scenario presented above, Figure 4 - proceeding from the publications "Nachrichtentechnik Elektronik", Berlin 45, (1995), No.1, Page 21 through 23 and No. 3, Pages 29 and 30, as well as IEE Colloquium 1993, 173; (1993), pages 29/1 - 29/7, W. Hing, F. Halsall: "Cordless access to the ISDN basic rate service" on the basis of a DECT/ISDN intermediate system DIIS according to ETSI Publication prETS - 300822, February 1997 - shows an ISDN ↔ DECT" Telecommunication system ID-TS (Integrated Services Digital Network ↔ Digital Enhanced Cordless Telecommunication) with an ISDN telecommunication sub-system I-TTS [see the publication "Nachrichtentechnik Elektronik", Berlin 41-43, Park: 1 through 10, T1: (1991) No. 3, pages 99 through 102; T2: (1991) No. 4, pages 138 through 143; T3: (1991) No. 5, Pages 179 through 182 and No. 6, pages 219 through 220; T4: (1991) No. 6, pages 220 through 222 and (1992) No. 1, pages 19 through 20; T5: (1992) No. 2, pages 59 through 62 and (1992) No. 3, pages 99 through 102; T6: (1992) No. 4, pages 150 through 153; T7: (1992) No. 6, pages 238 through 241; T8: (1993) No. 1, pages 29 through 33; T9: (1993) No. 2, pages 95 through 97 and (1993) No. 3, pages 129 through 135; T10: (1993) No. 4, pages 187 through 190] and a DECT telecommunication sub-system D-TTS.

As shall be explained in greater detail below, the DECT telecommunication sub-system D-TTS can thereby be a component part of a DECT/ISDN intermediate system DIIS or, respectively, of a RLL/WLL telecommunication sub-system RW-TTS. The DECT telecommunication sub-system

D-TTS and, thus, the DECT/ISDN intermediate system DIIS or, respectively, the RLL/WLL telecommunication sub-system RW-TTS are preferably based on a DECT/GAP system GDS as shown, for example, in Figure 1.

Alternatively, the DECT/ISDN intermediate system DIIS or, respectively,  
 5 the RLL/WLL telecommunication sub-system RW-TTS can also be based on a GSM system (global system for mobile communication; see Informatik Spektrum 14 (1991) June, No. 3, Berlin, DE; A. Mann: "Der GSM-Standard - Grundlage für digitale europäische Mobilfunknetze", pages 137 through 152). Instead, it is also possible within the scope of a hybrid telecommunication system that the ISDN  
 10 telecommunication system I-TTS is fashioned as GSM system or as PSTN system (public switched telecommunications network).

Coming into consideration over and above this as further possibilities for the realization of the DECT/ISDN intermediate system DIIS or, respectively, of the RLL/WLL telecommunication sub-system RW-TTS or of the ISDN  
 15 telecommunication sub-system I-TTS of the initially cited systems as well as future systems that are based on known multiple access methods FDMA, TDMA, CDMA (Frequency Division Multiple Access, Time Division Multiple Access, Code Division Multiple Access) and hybrid multiple access methods formed therefrom.

The employment of radio channels (for example DECT channels) in  
 20 classic line-bound telecommunication systems such as the ISDN (RLL/WLL scenario) is gaining increasingly in significance, particularly as viewed with the background of future, alternative network operators without their own complete wire network.

Given, for example, the RLL/WLL telecommunication sub-system RW-TTS, thus, the wireless connection technique RLL/WLL (radio in the local  
 25 loop/wireless in the local loop) shall make ISDN services available to the ISDN subscriber at standard ISDN interfaces, for example upon involvement of the DECT system DS (see Figure 4).

In the ISDN ↔ DECT telecommunication system ID-TS according to Figure 4, a first telecommunication subscriber (user) TCUI (telecommunication user)  
 30 has his terminal equipment TE (terminal endpoint; terminal equipment) linked into the

ISDN world with the services available therein, for example, via a standardized S-interface (S-bus), the DECT/ISDN intermediate system DIIS fashioned as local message transmission loop - preferably DECT-specific and contained in the RLL/WLL telecommunication sub-system RW-TTS - a network termination NT, and  
 5 a standardized U-interface of the ISDN telecommunication sub-system I-TTS and, second, a second telecommunication subscriber TCU2 is also linked into said ISDN world with the services available therein as ultimate user of the DECT/ISDN intermediate system DIIS.

The DECT/ISDN intermediate system DIIS is essentially composed of two  
 10 telecommunication interfaces, of a first telecommunication interface DIFS (DECT intermediate fixed system) and of a second telecommunication interface DIPS (DECT intermediate portable system) that are wirelessly connected to one another, for example via a DECT air interface. Due to the quasi-location-bound, first telecommunication interface DIFS, the DECT/ISDN intermediate system DIIS forms  
 15 the local message transmission loop defined above in this context. The first telecommunication interface DIIS contains a radio fixed part RFP, an interworking unit IWU1 and an interface circuit INC1 to the S-interface. The second telecommunication interface DIPS contains a radio portable RPP and an interworking unit IWU2 and, potentially, an interface circuit INC2 to the S-interface. The radio  
 20 fixed part RFP and the radio portable RPP thereby form the known DECT/GAP system DGS.

As already mentioned, Figure 4 shows, first, (first possibility), how the DECT/ISDN intermediate system DIIS is linked into the ISDN telecommunication sub-system I-TTS as local message transmission loop within the framework of the  
 25 RLL/WLL telecommunication sub-system RW-TTS as typical RLL/WLL scenario and, second (second possibility), how the DECT/ISDN intermediate system DIIS is only connected to the ISDN telecommunication sub-system I-TTS at the network side as seen from GAP points of view (cordless terminal ability access profiles). Given the second possibility, the interface circuit INC2 of the second telecommunication  
 30 interface DIPS to the S-interface is not active or is not present at all. In order to

graphically present and support this situation overall, the interface circuit INC2 of the second telecommunication interface DIPS is shown with broken lines. Whereas the second telecommunication interface DIPS given the first possibility, for example, is not fashioned mobile part-specific, i.e. with user interface, the second telecommunication interface DIPS in the second possibility is fashioned as typical mobile part with a user interface.

Based on the publication, "Nachrichtentechnik Elektronik" 42 (1992) January/February, No. 1, Berlin, DE, U. Pilger, "Struktur des DECT-Standards", pages 23 through 29 in conjunction with ETS 300 175-1...9, October 1992, Figure 5 shows the TDMA structure of the DECT/GAP system DGS. The DECT/GAP system is a hybrid system with respect to the multiple access methods, whereby radio messages according to the TDMA principle according to Figure 5 can be sent in a predetermined time sequence from the base station BS to the mobile part MT and from the mobile part MT to the base station BS (time division duplex mode) according to the FDMA principle on ten frequencies in the frequency band between 1.88 and 1.9 GHz. The time sequence is thereby defined by a multi-time frame MZR that occurs every 160 ms and that comprises 16 time frames ZR each respectively having a time duration of 10 ms. Information that relate to a C, M, N, P, Q channel defined in the DECT standard are separately transmitted in this time frame ZR to the base station BS and mobile part MT. When information for a plurality of these channels are transmitted in one time frame ZR, then the transmission ensues according to a priority list with  $M > C > N$  and  $P > N$ . Each of the sixteen time frames ZR of the multi-time frame MZR is in turn divided into twenty-four time slots ZS, each having a respective time duration of 417  $\mu$ s, each having a respective time duration 417  $\mu$ s, whereof 12 times ZS (time slots 0...11) are intended for the transmission direction base station BS  $\rightarrow$  mobile part MT and another 12 time slots ZS (time slots 12...23) are intended for the transmission direction mobile part MT  $\rightarrow$  base station BS. Information having a bit length of 480 bits are transmitted according to DECT standard in each of these time slots ZS. Of these 480 bits, 32 bits are transmitted as synchronization information in a sync field and 388 bits are transmitted as payload



information in a D-field. The remaining 60 bits are transmitted as auxiliary information in a Z-field and as protective information in a "guard time" field. The 388 bits of the D-field transmitted as payload information are in turn subdivided into an A-field 64 bits long, a B-field 320 bits long and an "X-CRC" word 4 bits long.

- 5 The 64 bit long A-field is composed of an 8 bit long data header, a 40 bit long data set with data for the C, Q, M, N, P channels and of a 16 bit long "A-CRC" word.

For setting up telecommunication connections between the base station or stations BS and the mobile part MT in the DECT systems according to Figures 1 through 5, the procedure described below is provided according to the DECT  
10 standard.

The base station BS (radio fixed part RFP) according to Figures 1 through 5 sends broadcast information via the DECT air interface at regular time intervals on simplex transmission paths, what are referred to as dummy bearers, these broadcast information being received by the mobile part MT (radio portable RPP) according to  
15 Figures 1 through 5 and serving said mobile part MT for synchronization and call setup with the base station. The broadcast information need not necessarily be transmitted on dummy bearers.

It is also possible that no dummy bearer is present because the base station is already maintaining at least one telecommunication connection, what is referred to  
20 as a traffic bearer, to another mobile part, and it then sends the necessary broadcast information thereon. In this case, the mobile part MT, RPP that would like to have a telecommunication connection to the base station BS, RFP receives the broadcast information - as in the transmission of the broadcast information on the dummy bearer.

25 According to ETSI publication ETS 300175-3, October 1992, Chapter 9.1.1.1, the broadcast information contain information about access rights, system information and paging information.

As already mentioned, DECT in a universal mobile telecommunication system is mainly understood as a "network access technology" for mobile  
30 communication services (see the presentation of A. Elberse, M. Barry, G. Fleming on

the subject, "DECT Data Services - DECT in Fixed and Mobile Networks", 17/18 June 1996, Hotel Sofitel, Paris; Pages 1 through 12 and summary) and not as a network. On the basis of the above discussion of various telecommunication systems, however, anyone can become his own network operator by acquiring a DECT systems that is customized for the respective requirements and, thus, differently configured.

In order to thereby be able to forego the network coordination, the DECT standard provides the dynamic channel allocation method (DCA method). When, for example, a DECT connection is set up, that frequency and that time window having the least interference is sought. The height (strength) of the interference is mainly dependent on whether

- (a) a conversation is already being carried out at a different base station or
- (b) a mobile part, due to movement, comes into visual contact with a previously occluded base station.

A boost in the interference deriving therefrom can be countered with the TDMA transmission method on which the DECT cordless telephone system is based. According to the TDMA method, only one time slot is used for the actual transmission; the other eleven time slots can be employed for measurements. As a result thereof, an alternative frequency/time slot pair can be determined onto which the connection can be switched. This occurs in the framework of an adaptive channel allocation according to the DECT standard (see Nachrichtentechnik Elektronik 42 (January/February 1992), No. 1, Berlin, U. Pilger, "Struktur des DECT-Standards", pages 28, point 3.2.6) on the basis of a "connection handover" (Intra-Cell Handover).

In addition to this "Intra-Cell Handover", the "inter-cell handover" or, respectively, the seamless handover should also be cited, this likewise being possible within the framework of the DECT-specific, adaptive channel allocation.

In order to get a handle on the regularly occurring "inter-cell handover" problem that particularly occurs in cellular, wireless telecommunication systems, the mobile radio reception device (mobile part) provided for such cellular radio telecommunication systems must be in the position at every time of an active

telecommunication connection to a (quasi) stationary radio transmission device (base station) to change the base station due to a change in cell within the cellular radio system (setup of a telecommunication connection to a different base station) and to thereby hand the already existing, active telecommunication connection over to the  
5 other base station interruption-free (seamlessly; seamless handover).

According to the publication, Nachrichtentechnik Elektronik 42 (January/February 1992), No. 1, Berlin, U. Pilger, "Struktur des DECT-Standards", pages 28, point 3.2.6, the DECT standard provides for this purpose that the mobile part, given a deterioration of the transmission quality of the existing  
10 telecommunication connection, sets up a second telecommunication connection parallel to the existing connection on the basis of indicators indicating the transmission quality (for example, signal field strength, CRC values, etc.). Given this "inter-cell handover" procedure, the fact that DECT mobile parts are constantly informed about the status of the channels available in the momentary environment  
15 within the framework of the dynamic, decentralized channel allocation (DCA method) such that the second connection is setup on the basis of the entry in a channel list.

An interruption-free handover is only possible with the above procedure when the mobile part is located in a cellular radio system having synchronized base stations. In such a synchronous, cellular radio system, the mobile part can then - in  
20 addition to the telecommunication connection to a base station (originating base station) that already exists - setup at least one further connection to a different base station in a different radio cell without thereby losing the synchronism of the originating base station. Such a synchronous cellular radio system, however, can only be realized with substantial system outlay (cable or radio synchronization).

25 A synchronization will be foregone and asynchronous relationships will be accepted wherever the outlay for the realization of a synchronous cellular radio system is not justified, for example, for cost reasons.

Figure 6 shows an at least partially asynchronous, wireless telecommunication network TKN preferably fashioned as DECT network that  
30 contains a plurality of wireless telecommunication systems TKS1....TKSn preferably fashioned as DECT systems (for example, according to Figures 1 through 5). Each

telecommunication system TKS1...TKSn comprises a plurality of base stations BS, RFP, DIFS arranged in radio cells FZ that are connectible by wireless telecommunication (for example, according to the DECT air interface protocol) with mobile parts MT, RPP, DIPS (roaming radio mobile part) residing or, respectively, moving independently of location in the telecommunication systems TKS1...TKSn and in the telecommunication network TKN. The radio cells FZ in the telecommunication system TKS1...TKSn are combined to form what is referred to as a radio cluster that, for example, is composed of base stations BS, RFP, DIFS, synchronized with one another. The radio cells FZ are hexagonally shown (honeycomb-shaped) in order, on the one hand, to be able to graphically show a 100% radio coverage and, on the other hand, to obtain a surveyable illustration. The circular radio area of a base station respectively deriving under ideal geographical and physical conditions is shown for radio cells FZ' standing for all radio cells FZ. In this illustration, respectively overlapping or, respectively, intersecting radio areas (overlap or, respectively, intersection areas) derive. The "roaming" mobile parts - dependent on the plurality of overlapping or, respectively, intersecting radio areas, can setup radio connections to a plurality of base stations and potentially maintain them in these overlap or, respectively, intersection areas.

The special characteristic of the illustrated telecommunication network TKN is then comprised therein that the base stations BS, RFP, DIFS in the individual telecommunication systems TKS1...TKSn are in fact synchronized with one another but that the individual telecommunication systems TKS1...TKSn are either not synchronized at all or only partially synchronized (at least partially asynchronous telecommunication network TKN). In the illustrated case, first telecommunication systems TKS1...TKS7 are not synchronized, i.e. are asynchronous relative to one another, whereas second telecommunication systems TKS<sub>n</sub>-2, TKS<sub>n</sub>-1, TKS<sub>n</sub> are synchronized with one another for illustrating this situation. In the present telecommunication network TKN, accordingly, there are base stations in the edge areas of the first telecommunication systems TKS1...TKS7 wherein at least one neighboring base station among respectively neighboring base stations is not synchronized with the appertaining base station, i.e. is asynchronous.

The current situation with respect to "roaming" of the mobile parts MT, RPP, DIPS in such at least partially asynchronous telecommunication networks TKN takes on the following form:

- Mobile parts presently obtainable in the marketplace (for example, the
- 5 Siemens mobile part "Gigaset 1000C or 1000S" or other DECT/GAP terminal devices) allocate themselves, for example in the idle lock mode (see ETSI publication ETS 300175-3, October 1992, Chapter 4.3.1) to that base station among all possible base stations that can be received at a location that, for example, is received with the greatest field strength. Alternatively, the transmitted CRC values or, respectively, a
- 10 combination of both possibilities is also available as decision criterion for the allocation to a base station. When the mobile part has allocated itself to a base station, then the mobile part allocates itself to another base station when the reception quality of the allocated base station becomes poorer. Two cases are distinguished in the allocation to a new base station:
- 15 1. The reception quality of the current base station deteriorates so greatly that the mobile part loses radio contact with the allocated base station, and synchronization with the base station can no longer be maintained due to the poor reception quality. In this case, the mobile part switches into what is referred to as a "free run scan mode" and attempts to synchronize to the base station received best from all received base
- 20 stations.
2. The quality of the allocated base station becomes poorer but radio contact with the previously allocated base station does not break off, i.e. the mobile part receives the signals of the base station with poor quality but is still synchronized to the allocated base station. In this case, the mobile part searches for neighboring base stations that
- 25 are synchronized in terms of widths, time slot and/or time frame with the allocated base station and that can be received by the mobile part with better quality. When the mobile part finds no better base stations in view of the indicated synchronism criteria, the mobile part remains allocated to the previous base station, even when the reception quality of this allocated base station becomes poor.

- 30 The disadvantage in case 2 is comprised therein that, when there is a neighboring base station asynchronous in view of the indicated synchronism criteria

that the mobile part would receive with better quality, the mobile part will not find this asynchronous base station since it can only locate synchronous base stations as long as there is radio contact with the allocated base station and the synchronization is not lost.

5 WO 97/15160 discloses a telecommunication system with base stations and at least one mobile part wherein the radio environment is scanned for synchronous or asynchronous radio connections. A handover to a synchronous connection ensues seamlessly, and, given a handover in an asynchronous radio environment, a connection of a mobile station to a first base station is handed over to  
10 a second base station in that the transmission of the mobile station via a first radio connection is interrupted, whereas the first base station contains to maintain the transmission via the first radio connection, and, subsequently, a second radio connection from the mobile station to the second base station is set up and the connection is continued via this radio connection after the radio connection from the  
15 first base station has been released.

US 5,448,569 discloses a method or, respectively, arrangement in a wireless communication network with mobile stations and base stations wherein, first, the mobile station is in the position of acquiring the quality of the connection that it maintains with a first base station and, second, steps or, respectively, means are  
20 offered with which this connection is handed over to a second base station when the acquired quality falls below a predetermined value.

The object underlying the invention is comprised in qualitatively improving the roaming of mobile parts in at least partially asynchronous wireless telecommunication networks.

25 Proceeding from the telecommunication system defined in the preamble of patent claim 1, this object is achieved by the features recited in the characterizing part of patent claim 1.

Proceeding from the telecommunication systems defined in the preamble of patent claim 20, this object is also achieved by the features recited in the  
30 characterizing part of patent claim 20.

The idea underlying the invention (claim 1) is comprised in improving the roaming of mobile parts in at least partially asynchronous, wireless telecommunication network with telecommunication systems having a plurality of base stations of the initially outlined species arranged in radio cells, first base stations or a part of these first base stations to which at least one asynchronous, second base station is respectively proximate send information to first mobile parts connectible by telecommunication with the first base stations that indicate that the respective, first base station sending the information is surrounded by at least one second base station. [sic]

Given DECT base stations, the transmitted information are RFP status signals transmitted on broadcast channels (see ETSI publication ETS-300175-3, October 1992, Chapter 7.2.4.3.9) that contain corresponding signal information.

According to claim 9, it is advantageous when the first mobile parts, given a certain deterioration of the reception quality, briefly leave radio contact or, respectively, the synchronization after receiving the information (for a predetermined, short time span) in order to also seek asynchronous base stations and, thus, improve the quality of the radio contact. In this way, the first mobile parts have knowledge that at least one asynchronous, second base station is also located in the proximity in addition to the synchronous, first base stations or that only asynchronous, second base station is also located in the proximity in addition to the synchronous, first base stations or that only a synchronous, second base stations are located therein.

When the connection to the allocated, first base station becomes poor and when the first mobile part has detected the RFP status signal "asynchronous, second base station present", then, according to claims 10 through 20, the following algorithm can run in the first mobile part, based on WO 96/38991 (see, for example, Fig. 9 in conjunction with patent claims 1 through 3):

When the first mobile part finds no better, synchronous, first base station and when the connection becomes poorer for a certain time, for example when the reception level lies below a predetermined threshold for a certain time interval, then the mobile part should switch to the "free run scan mode" and seek the neighboring, asynchronous, second base station or stations or, respectively, the strongest base

station. When the search for other base stations is not successful then the mobile part can return to the old base station since it still represents the base station received best. The search for a synchronous, second base station can be re-initiated after the

5 expiration of a first time counter (timer) of, for example, five minutes.

When the mobile part has found an asynchronous, second base station, then it should in turn seek further, asynchronous second base stations only after the expiration of a second time counter (timer) of, for example, five seconds, even though



**PATENT CLAIMS**

1. Telecommunication systems for wireless, at least partially asynchronous telecommunication networks, particularly DECT systems for at least partially asynchronous DECT networks, comprising first base stations (BS1, RFP1, DIFS1) that are synchronous with first mobile parts (MT1, RPP1, DIPS1) and in whose proximity at least respectively one second base station (BS2, RFP2, DIFS2) that is/are respectively asynchronous relative to the first base stations (BS1, RFP1, DIFS1) is arranged, whereby the base stations (BS1, RFP1, DIFS1, BS2, RFP2, DIFS2) and first mobile stations (MT1, RPP1, DIPS1) are connectible by the wireless transmission of messages, characterized in that first messages (N1) having first information are at least temporarily sent at least from one part of the first base stations (BS1, RFP1, DIFS1), whereby the information indicate that the first base stations (BS1, RFP1, DIFS1) are respectively surrounded by at least one of the second base station [sic] (BS2, RFP2, DIFS2).
2. Telecommunication systems according to claim 1, characterized in that the synchronism between the first base stations (BS1, RFP1, DIFS1) and the first mobile parts (MT1, RPP1, DIPS1) exists in the idle locked mode of the first mobile parts (MT1, RPP1, DIPS1).
3. Telecommunication systems according to claim 1 or 2, characterized in that the synchronism between the first base stations (BS1, RFP1, DIFS1) and the first mobile parts (MT1, RPP1, DIPS1) exists in the active locked mode of the first mobile parts (MT1, RPP1, DIPS1).
4. Telecommunication systems according to one of the claims 1 through 3, characterized in that the telecommunication systems (TKS1...TKS7) are TDMA-based telecommunication systems.
5. Telecommunication systems according to claim 4, characterized in that the first base stations (BS1, RFP1, DIFS1) are respectively asynchronous relative

to the second base station or stations (BS2, RFP2, DIFS2) in view of the bit, time slot and/or time frame synchronism.

6. Telecommunication systems according to one of the claims 1 through 5, characterized in that the part of the first base stations (BS1, RFP1, DIFS1) regularly sends the first messages (N1) with the first information.

7. Telecommunication systems according to one of the claims 1 through 6, characterized in that the part of the first base stations (BS1, RFP1, DIFS1) automatically sends the first messages (N1) with the first information.

8. Telecommunication systems according to one of the claims 1 through 6, characterized in that the part of the first base stations (BS1, RFP1, DIFS1) is initiated by the network side to send the first messages (N1) with the first information.

9. Telecommunication systems according to one of the claims 1 through 8, characterized in that the first mobile parts (MT1, RPP1, DIPS1) - after receiving the first messages - become asynchronous relative to the first base stations (BS1, RFP1, DIFS1) for a predetermined time span dependent on mobile part location-specific reception criteria in order to search for second base stations (BS2, RFP2, DIFS2).

10. Telecommunication systems according to claim 4 and 9, characterized in that the first mobile parts (MT1, RPP1, DIPS1) are respectively asynchronous relative to the first base stations (BS1, RFP1, DIFS1) in view of the bit, time slot and/or time frame synchronism.

11. Telecommunication systems according to claim 9, characterized in that the first mobile parts (MT1, RPP1, DIPS1) interrupt the search for a

predetermined time span after they have searched for the second base stations (BS2, RFP2, DIFS2).

12. Telecommunication systems according to claim 11, characterized in that the first mobile parts (MT1, RPP1, DIPS1) comprise time counters (ZZ) for acquiring the time span.

13. Telecommunication systems according to claim 12, characterized in that the first base stations (BS1, RFP1, DIFS1) load the time counters (ZZ) of the first mobile parts (MT1, RPP1, DIPS1) with the predetermined time span as start value on the basis of the wireless transmission of the messages.

14. Telecommunication systems according to claim 13, characterized in that the first base stations (BS1, RFP1, DIFS1) comprise memories (SP) wherein the time span are [sic] respectively stored.

15. Communication systems according to claim 13 or 14, characterized in that the time span can be delivered to the first base stations (BS1, RFP1, DIFS1) from the network side.

16. Telecommunication systems according to one of the claims 9 through 15 and according to claim 4, characterized in that the time span is a multiple of the time slot or time frame.

17. Telecommunication systems according to one of the claims 9 through 16, characterized in that the first mobile parts (MT1, RPP1, DIPS1) repeat the search procedures at regular time intervals given unsuccessful attempts to seek the second base stations (BS2, RFP2, DIFS2).

18. Telecommunication systems according to one of the claims 9 through 17, characterized in that the mobile location-specific reception criteria are the

downward transgression of mobile part location-specific reception field strength thresholds.

19. Telecommunication systems according to claim 18, characterized
- 5 in that the mobile part location-specific reception field strength thresholds and threshold for initiation of inter-cell handover are of the same size.

**ABSTRACT****Roaming of Mobile Parts in at Least Partially Asynchronous Telecommunication Networks, Particularly DECT Networks**

---

In order to qualitatively improve roaming of mobile parts (MT, RPP, DIPS) in at least partially asynchronous, wireless telecommunication networks (TKN) with telecommunication systems (TKS1...TKSn) having a plurality of base stations (BS, RFP, DIFS) arranged in radio cells (FZ), first base stations (BS1, RFP1, DIFS1) which are respectively neighbored by at least one asynchronous second base station (BS2, RFP2, DIFS2) send information to first mobile parts (MT1, RPP1, DIPS1) connectible by telecommunication to the first base stations (BS1, RFP1, DIFS1), said information indicating that the respective, first base station (BS1, RFP1, DIFS1) sending the information is surrounded by at least one second base station (BS2, RFP2, DIFS2).

Figure 7

- 1 -

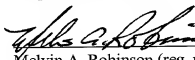
IN THE UNITED STATES ELECTED OFFICE  
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE  
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

**"SUBMITTAL OF DRAWINGS"**

5 APPLICANT: Egon SCHULZ et al.  
SERIAL NO.: EXAMINER:  
FILING DATE: ART UNIT:  
INTERNATIONAL APPLICATION NO.: PCT/DE98/02474  
INTERNATIONAL FILING DATE: 24 August 1998  
10 INVENTION: ROAMING OF MOBILE PARTS IN AT LEAST  
PARTIALLY ASYNCHRONOUS  
TELECOMMUNICATION NETWORKS,  
PARTICULARLY DECT NETWORKS  
Hon. Assistant Commissioner for Patents  
15 Box PCT  
Washington D.C. 20231  
SIR:

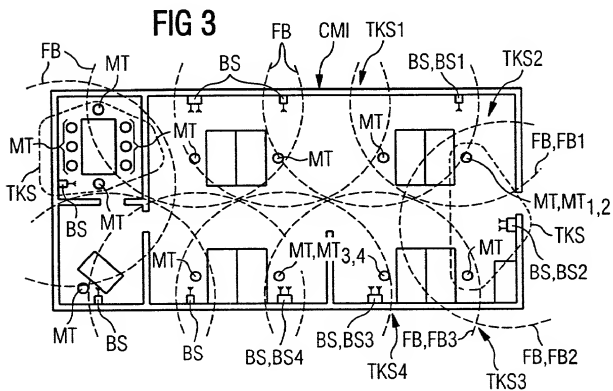
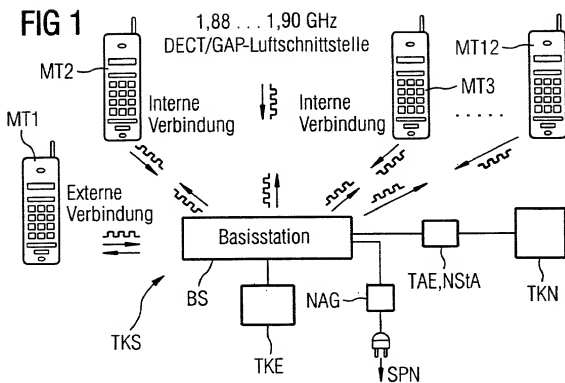
Enclosed are copies of the eight sheets of drawings showing Figures 1-7B  
as filed in the present application. Also enclosed is a copy of the drawings  
20 marked with the English translation of the German text.

Respectfully submitted,

  
Melvin A. Robinson (reg. no. 31,870)  
Hill & Simpson  
A Professional Corporation  
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Telephone: 312-876-0200 ext. 3044

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ATTORNEY FOR APPLICANT



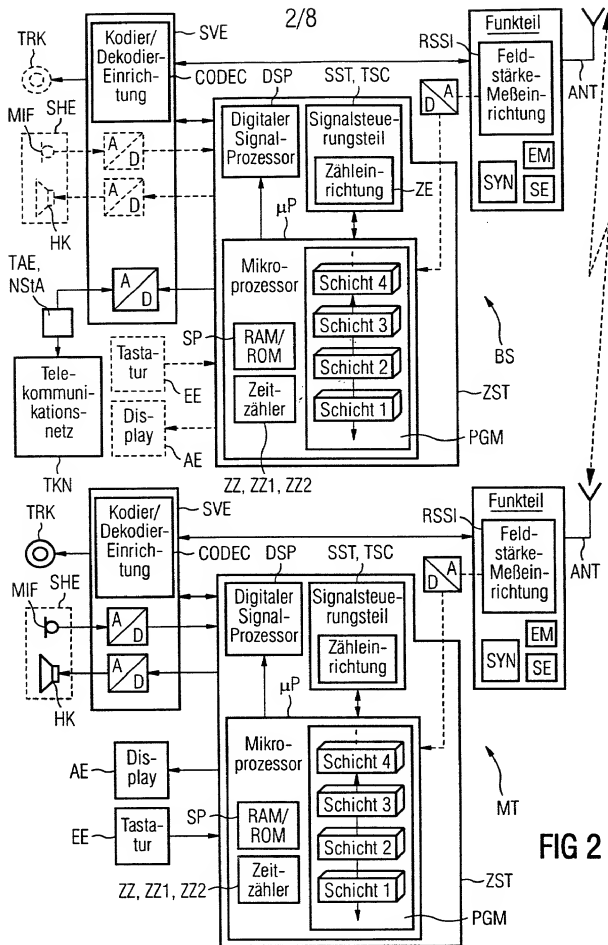


FIG 2



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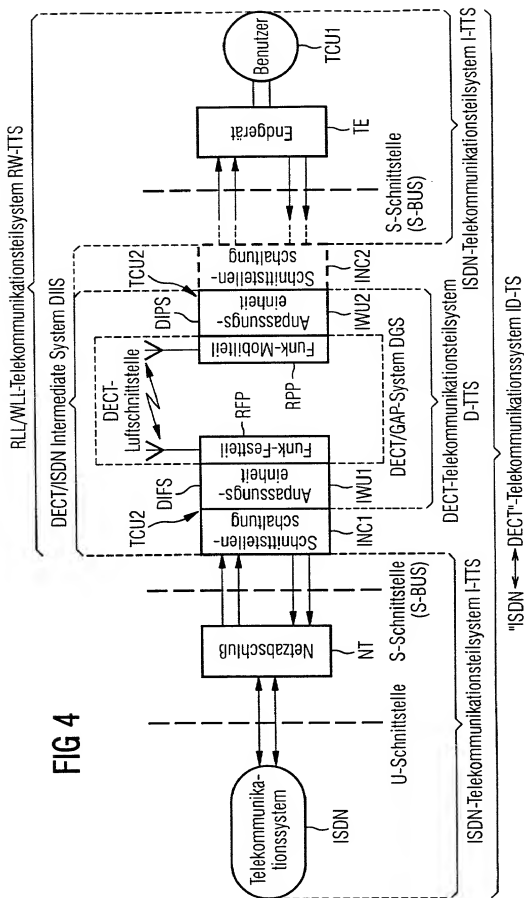
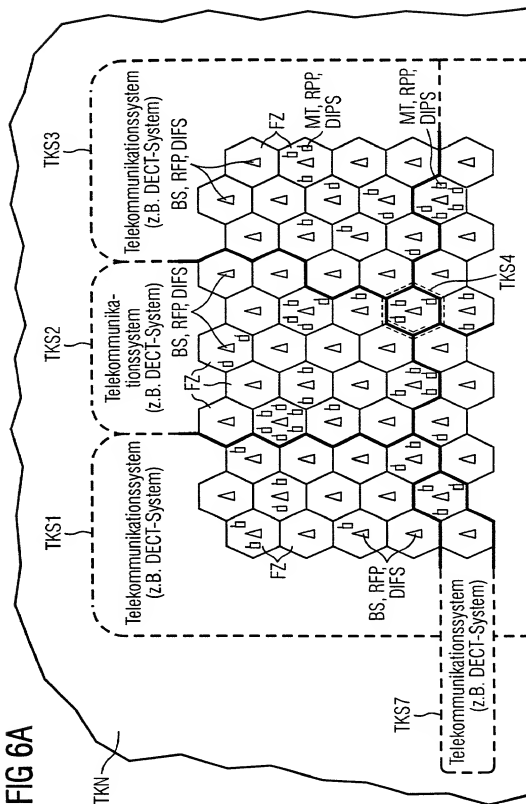




FIG 6A



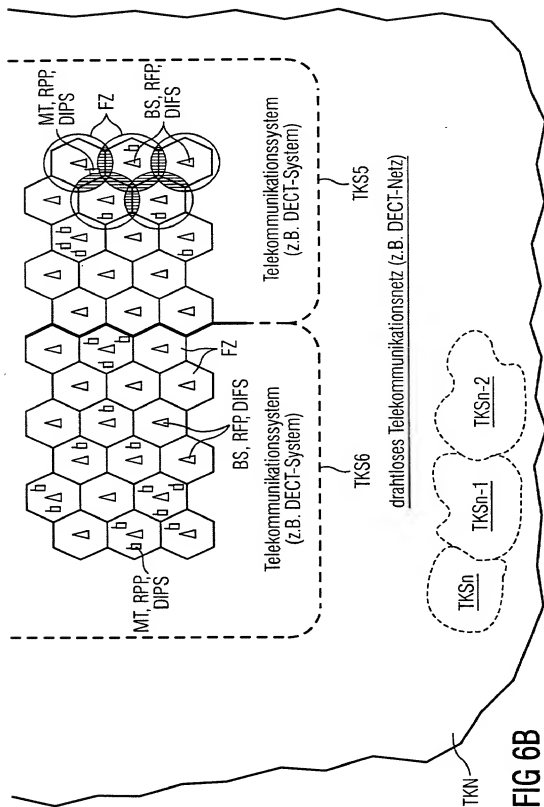
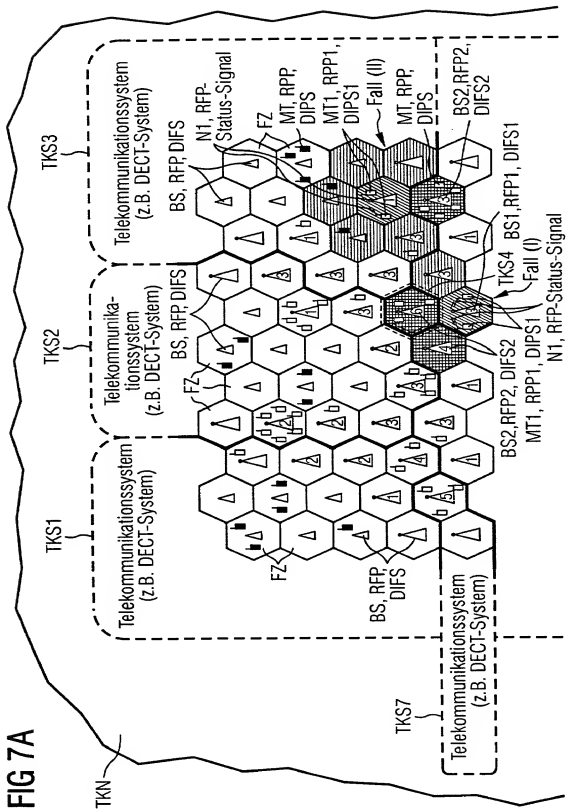


FIG 6B

**FIG 7A**



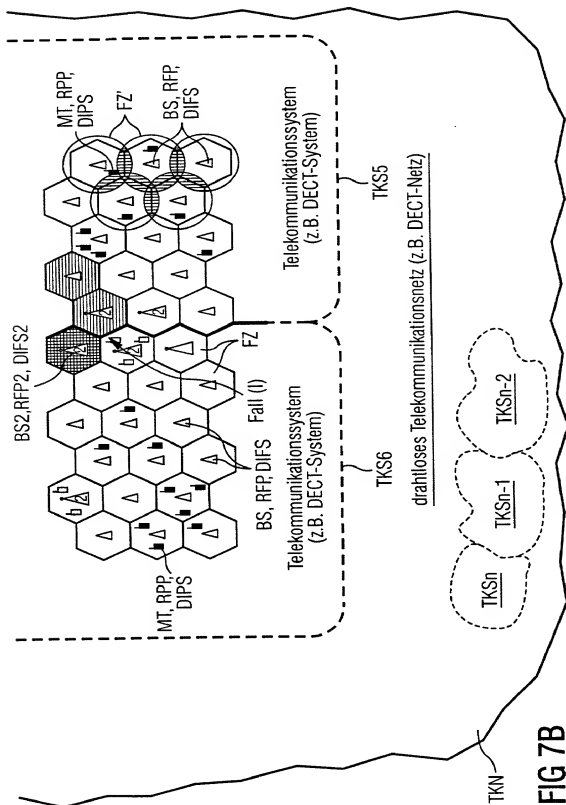
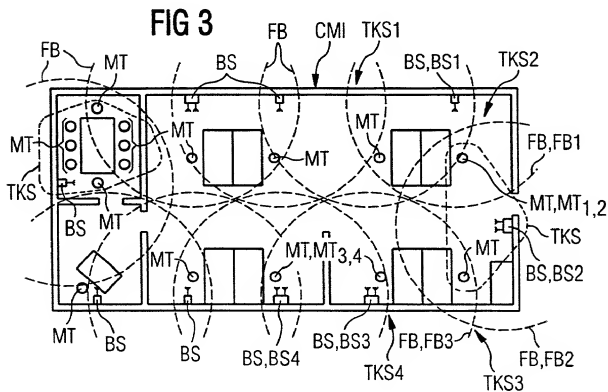
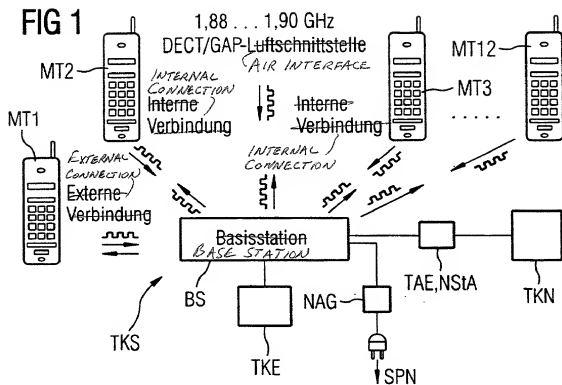


FIG 7B

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# AIR INTERFACE TELECOMMUNICATION SUBSYSTEM

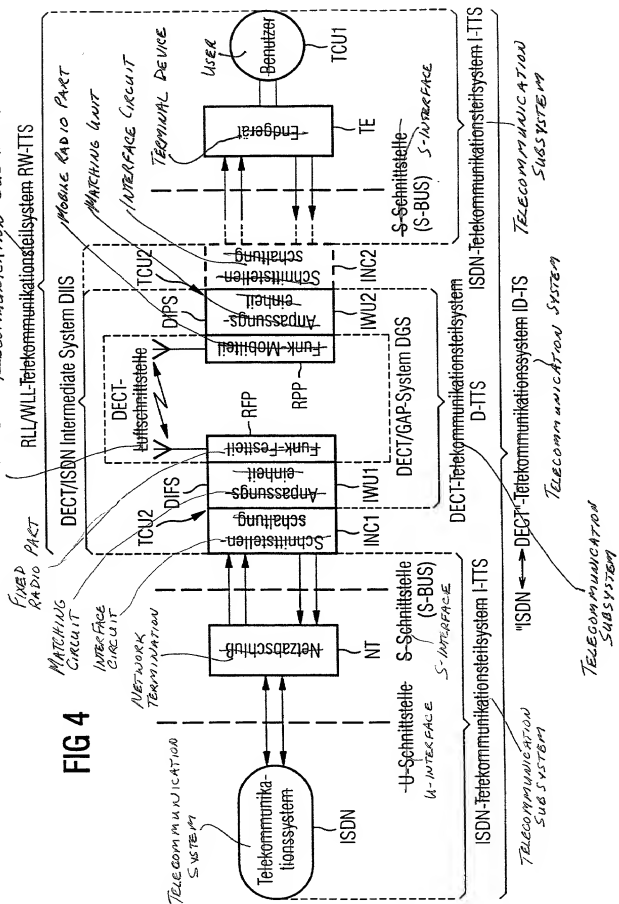


FIG 5

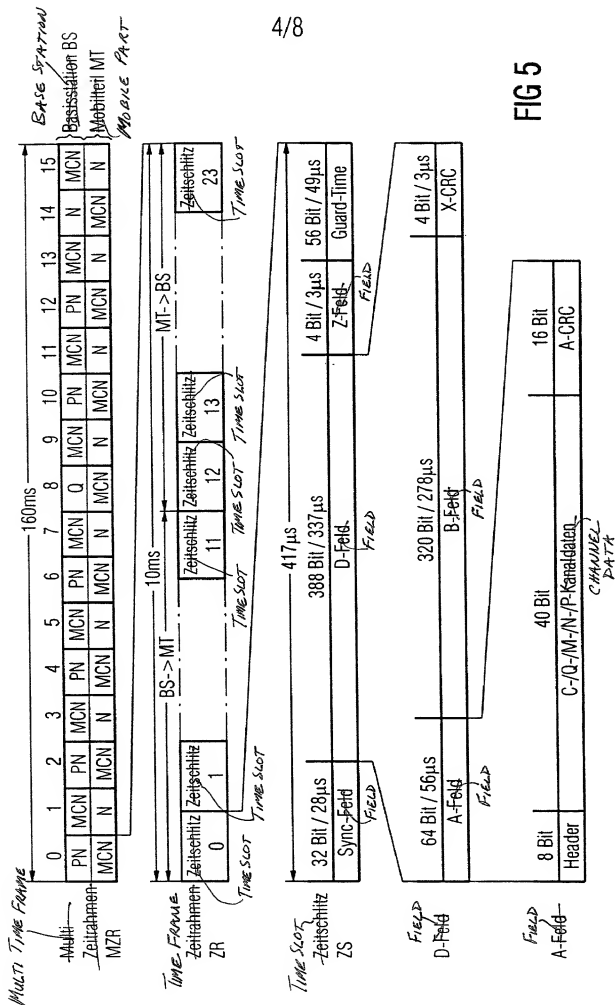
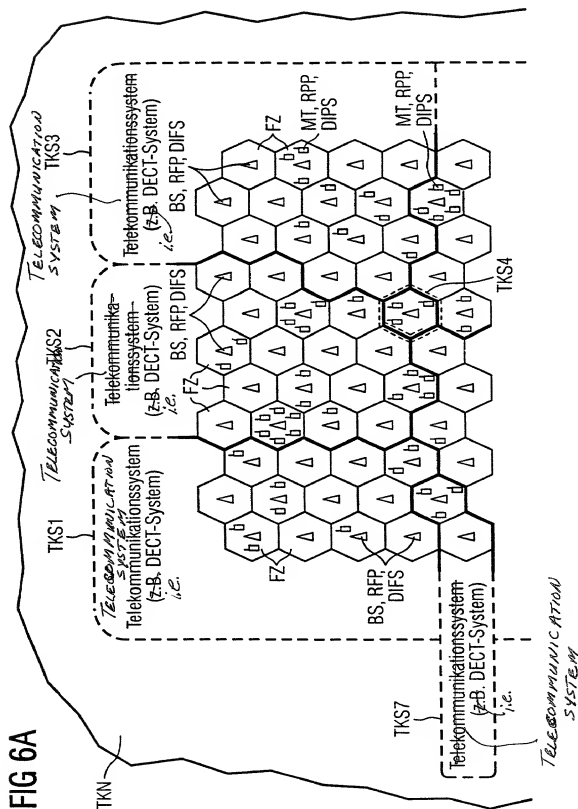


FIG 6A



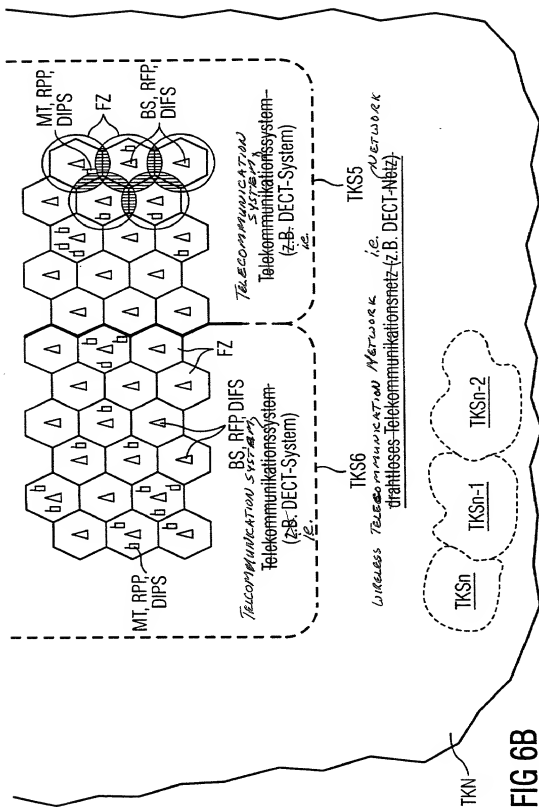
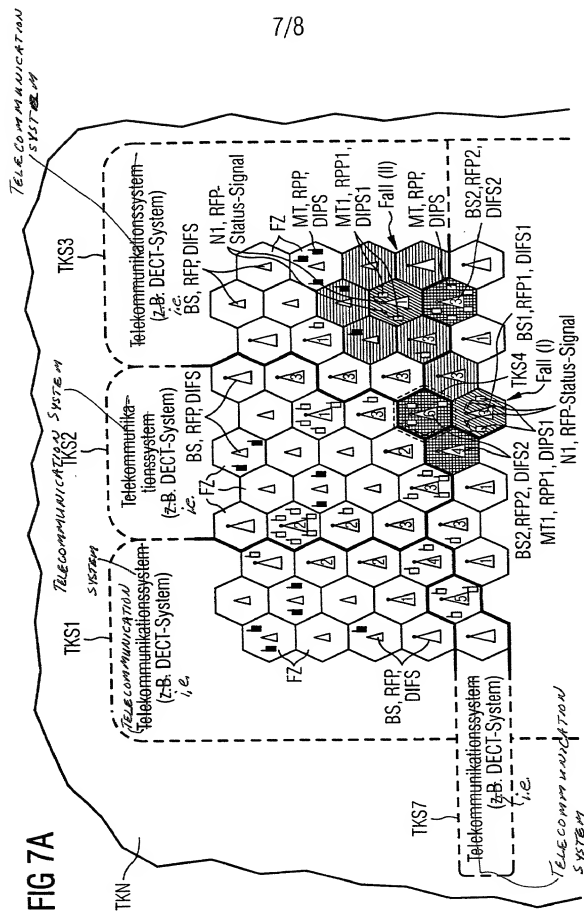


FIG 6B



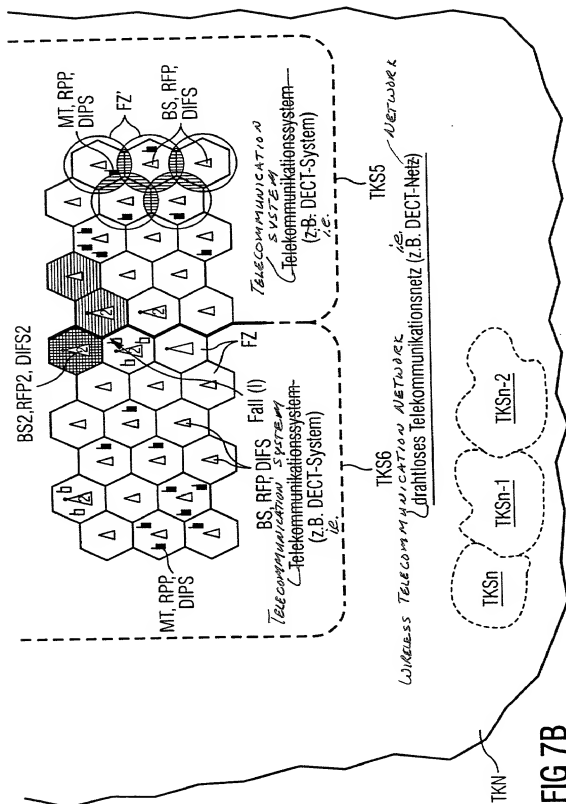


FIG 7B

# Declaration and Power of Attorney For Patent Application

## Erklärung Für Patentanmeldungen Mit Vollmacht

### German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit  
an Eldes Statt:

As a below named inventor, I hereby declare that:

dass mein Wohnsitz, meine Postanschrift, und meine  
Staatsangehörigkeit den im Nachstehenden nach  
meinem Namen aufgeführten Angaben entsprechen,

My residence, post office address and citizenship are  
as stated below next to my name,

dass ich, nach bestem Wissen der ursprüngliche,  
erste und alleinige Erfinder (falls nachstehend nur ein  
Name angegeben ist) oder ein ursprünglicher, erster  
und Miterfinder (falls nachstehend mehrere Namen  
aufgeführt sind) des Gegenstandes bin, für den dieser  
Antrag gestellt wird und für den ein Patent beantrag  
wird für die Erfindung mit dem Titel:

I believe I am the original, first and sole inventor (if  
only one name is listed below) or an original, first and  
joint inventor (if plural names are listed below) of the  
subject matter which is claimed and for which a patent  
is sought on the invention entitled

Roaming von Mobilteilen in zumindest  
teilweise asynchronen drahtlosen  
Telekommunikationsnetzen,  
insbesondere DECT-Netzen  
deren Beschreibung

(zutreffendes ankreuzen)

☒ hier beigefügt ist.

☐ am \_\_\_\_\_ als

PCT internationale Anmeldung

PCT Anmeldungsnummer \_\_\_\_\_

eingereicht wurde und am \_\_\_\_\_

abgeändert wurde (falls tatsächlich abgeändert).

the specification of which

(check one)

☐ is attached hereto.

☐ was filed on \_\_\_\_\_ as

PCT international application

PCT Application No. \_\_\_\_\_

and was amended on \_\_\_\_\_  
(if applicable)

Ich bestätige hiermit, dass ich den Inhalt der obigen  
Patentanmeldung einschliesslich der Ansprüche  
durchgesehen und verstanden habe, die eventuell  
durch einen Zusatzantrag wie oben erwähnt abgeän-  
dert wurde.

I hereby state that I have reviewed and understand the  
contents of the above identified specification,  
including the claims as amended by any amendment  
referred to above.

Ich erkenne meine Pflicht zur Offenbarung irgendwel-  
cher Informationen, die für die Prüfung der vorliegen-  
den Anmeldung in Einklang mit Absatz 37, Bundes-  
gesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind,  
an.

I acknowledge the duty to disclose information which  
is material to the examination of this application in  
accordance with Title 37, Code of Federal  
Regulations, §1.56(a).

Ich beanspruche hiermit ausländische Prioritätsvor-  
teile gemäss Abschnitt 35 der Zivilprozessordnung der  
Vereinigten Staaten, Paragraph 119 aller unten ange-  
gebenen Auslandsanmeldungen für ein Patent oder  
eine Erfindersurkunde, und habe auch alle Auslands-  
anmeldungen für ein Patent oder eine Erfindersurkun-  
de nachstehend gekennzeichnet, die ein Anmelde-  
datum haben, das vor dem Anmeldedatum der  
Anmeldung liegt, für die Priorität beansprucht wird.

I hereby claim foreign priority benefits under Title 35,  
United States Code, §119 of any foreign application(s)  
for patent or inventor's certificate listed below and  
have also identified below any foreign application for  
patent or inventor's certificate having a filing date  
before that of the application on which priority is  
claimed:

# German Language Declaration

Prior foreign applications  
Priorität beansprucht

Priority Claimed

197 38 340.8

Germany

02. September 1997

(Number)  
(Nummer)

(Country)  
(Land)

(Day Month Year Filed)  
(Tag Monat Jahr eingereicht)



Yes  
Ja

No  
Nein

(Number)  
(Nummer)

(Country)  
(Land)

(Day Month Year Filed)  
(Tag Monat Jahr eingereicht)



Yes  
Ja

No  
Nein

(Number)  
(Nummer)

(Country)  
(Land)

(Day Month Year Filed)  
(Tag Monat Jahr eingereicht)



Yes  
Ja

No  
Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.)  
(Anmeldeseriennummer)

(Filing Date)  
(Anmeldedatum)

(Status)  
(patentiert, anhängig,  
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(Status)  
(patented, pending,  
abandoned)

(Application Serial No.)  
(Anmeldeseriennummer)

(Filing Date)  
(Anmeldedatum)

(Status)  
(patentiert, anhängig,  
aufgeben)

(Status)  
(patented, pending,  
abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden können, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

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# German Language Declaration

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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

And I hereby appoint

Messrs. John D. Simpson (Registration No. 19,842) Lewis T. Steadman (17,074), William C. Stueber (16,453), P. Phillips Connor (19,259), Dennis A. Gross (24,410), Marvin Moody (15,549), Steven H. Noll (28,982), Brett A. Valkquist (27,843), Thomas I. Ross (29,278), Kevin W. Gwynn (29,927), Edward A. Lehmann (22,312), James D. Hobart (24,149), Robert M. Barlett (30,142), James Van Santon (18,584), J. Arthur Gross (13,615), Richard J. Schwarz (13,472) and Melvin A. Robinson (31,870), David R. Metzger (32,919), John R. Garrett (27,888) all members of the firm of Hill, Steadman & Simpson, A Professional Corporation.

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Full name of sole or first inventor:

SCHULZ, Egon

Unterschrift des Erfinders

Datum

Inventor's signature

Date

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10/08/88

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Datum

Second inventor's signature

Date

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17.08.88

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Bundesrepublik Deutschland

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(Supply similar information and signature for third and subsequent joint inventors).